

BRIEFER ARTICLES

A NOTE ON THE GENERATIONS OF POLYSIPHONIA¹

(WITH ONE FIGURE)

YAMANOUCHI² concludes from his cytological work on *Polysiphonia violacea* that "there is an alternation of a sexual plant (gametophyte) and an asexual plant (sporophyte) in the life history of *Polysiphonia*, the cystocarp being included as an early part of the sporophytic phase." He found that on the cystocarpic plants there was an occasional abnormality "in the form of a cell resembling a monospore, but having the same cell lineage as the tetraspore mother cell." He traced the development of these cells and found that although cleavage furrows appeared, the nucleus rarely entered a mitosis and the cell never divided. He makes note of the fact that LOTSY has found tetraspores on the same plants with sexual organs in *Chylocladia kaliformis* and that DAVIS has found the same condition in *Spermatothamnion Turneri*, *Ceramium rubrum*, and *Callithamnion Baileyi*. He suggests that possibly the structures reported as tetraspores are really monospores and are developed with a suppression of reduction phenomena, or that the sexual organs are developed apogamously.

LEWIS³ has attempted an experimental test of the truth of YAMANOUCHI'S conclusion. He says: "Cytological observations on *Polysiphonia* by YAMANOUCHI, on *Griffithsia* by myself, and on *Delesseria* by SVEDELIUS render it probable that in these genera at least, and presumably in all Florideae in which tetraspores and sexual organs are borne on separate individuals, there exists an alternation of sexual and asexual plants, the carpospores giving rise on germination to asexual, and the tetraspores to sexual individuals." The results that he obtained by growing plants from the spores of *Polysiphonia violacea*, *Griffithsia Bornetiana*, and *Dasya elegans* are consistent with the above theory, no carpospores having been found to produce sexual individuals, and no tetraspores to produce asexual individuals. Both the cytological and the experimental evidence would thus seem to unite in indicating that

¹ Contributions from the Puget Sound Marine Station, no. 2.

² YAMANOUCHI, S., The life history of *Polysiphonia*. BOT. GAZ. 42:401-449. 1906.

³ LEWIS, I. F., Alternation of generations in certain Florideae. BOT. GAZ. 53:236-242. 1912.

there is an alternation of generations in at least *Polysiphonia violacea*, and to offer at least some foundation for the belief that it is general among the red algae.

In 1911 Professor T. C. FRYE found in *Polysiphonia* material, collected at the Puget Sound Marine Station in 1910, some specimens showing both carpospores and tetraspores on the same individual. This observation was made in the course of laboratory work with a class and no material was kept. He suggested to the senior author of this note that the subject be investigated further at the Puget Sound Marine Station. The junior author examined the *Polysiphonia* material that was brought into the laboratory at the station during the session of 1911. In one lot of material she found the same condition to which Professor FRYE had referred. The material was collected in the lower littoral zone on the rocky shore of Turn Island, near Friday Harbor, Washington. It has been identified by Professor W. A. SETCHELL of the University of California as *Pterosiphonia bipinnata* and by Dr. SHIGÉO YAMANOUCHI of the University of Chicago as *Polysiphonia* sp.

The fact that the mother cells had gone to the point of complete division into tetraspores in the material examined indicates that the tetraspores were not abortive, and the fact that carpospores were seen issuing from cystocarpic plants that bore also perfect tetraspores indicates that the cystocarps were not abortive. We have thus an individual that is both sexual and asexual, which is inconsistent with there always being in this species an alternation of a sexual individual and an asexual.

Professor T. C. FRYE and the senior author of this note are now at work on the cytology of specimens of this species with a view to determining the sporophytic or gametophytic nature of this generation by means of mitotic studies.—GEORGE B. RIGG and ANNIE D. DALGITY.

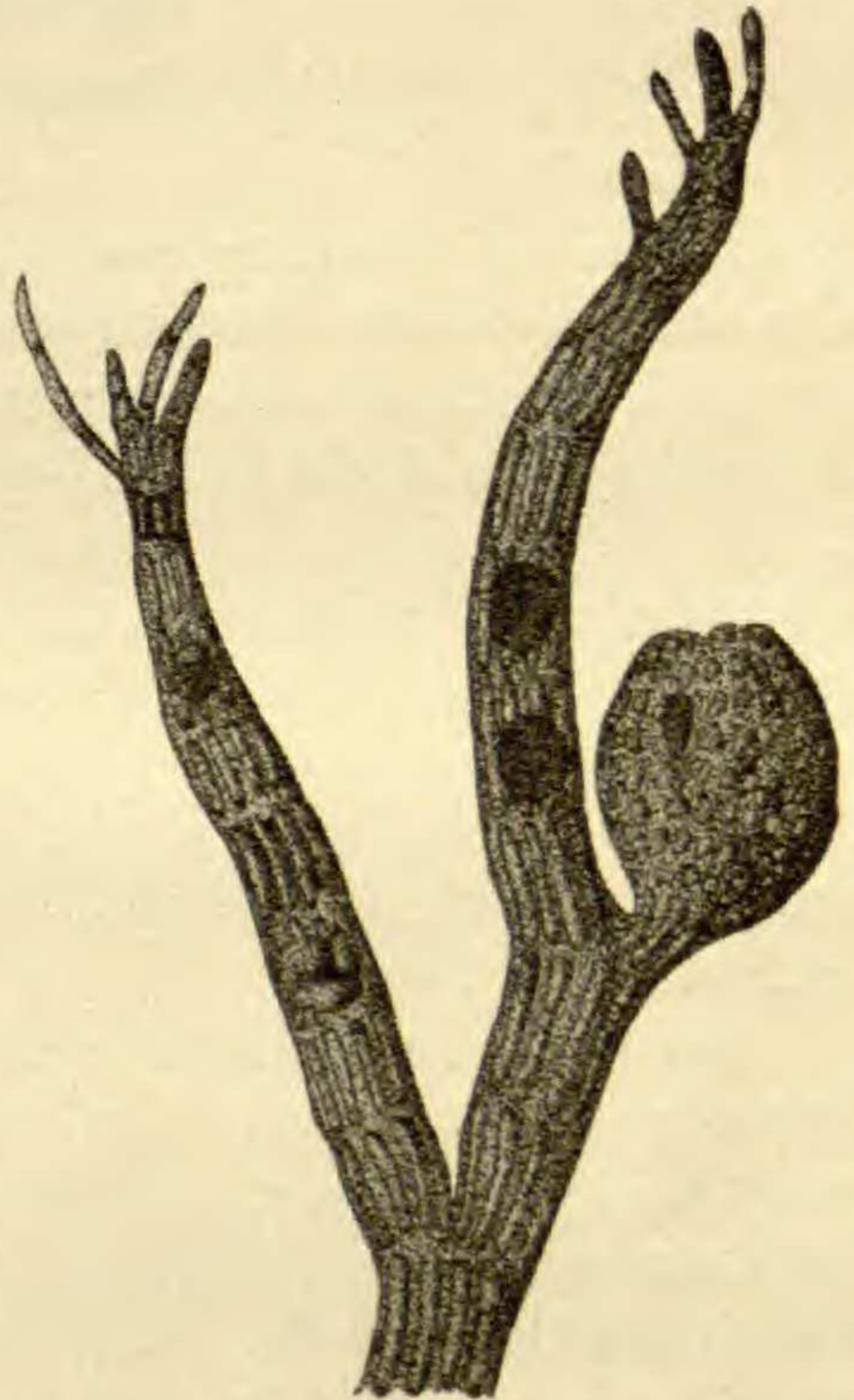


FIG. 1.—Camera lucida drawing of a portion of a *Polysiphonia* (?), showing on the same individual both tetraspores and a cystocarp with a carpospore.